Appendix B
Glossary

ABUTMENT. The foundation along the sides of the valley or gorge against which the dam is constructed.

ACCELEROGRAM. The record from an accelerometer showing acceleration as a function of time.

AGGREGATE. The natural sands, gravels, and crushed stones used in the manufacture of concrete. Aggregate for concrete commonly is obtained from alluvial stream deposits or from rock quarries.

ANISOTROPIC. Exhibiting properties with different values when measured along axes in different directions.

APPURTENANT FEATURE. Any physical feature other than the dam, such as the spillway, outlet, powerhouse, penstock, tunnels, etc.

AUTOGENOUS VOLUME CHANGE. Change in volume produced by continued hydration of cement exclusive of effects of external forces or change of water content or temperature (ACI 116R-85).

BEDROCK. The solid rock foundation of a dam, usually overlain by soil or other unconsolidated superficial material.

BOND. The adhesion of concrete or mortar to other concrete layers, rock, and other surfaces.

BOND STRENGTH. Resistance to separation of concrete or mortar and other contact surfaces.

BOND STRESS. The force per unit area of contact between two bonded surfaces.

COEFFICIENT OF THERMAL EXPANSION. The change in linear dimension per unit length divided by the temperature change (see also paragraph 6-2).

COFFERDAM. A temporary structure constructed around part or all of the excavation for a dam or other appurtenant features to facilitate construction in the dry.

COMPRESSIVE STRENGTH. The maximum resistance of a concrete or mortar specimen to axial loading, expressed as force per unit cross-sectional area, or the specified resistance used in design calculations, in the US customary units of measure expressed in pounds per square inch and designated f'_c (ACI 116R-85) (see also Chapter 3).

CONCRETE. A composite material that consists essentially of a binding medium which is embedded particles or fragments of aggregate; in portland cement concrete, the binder is a mixture of portland cement and water (ACI 116R-85).

CONSTRUCTION JOINT. The surface between two consecutive placements of concrete that develops bond strength (see also paragraph 7-1).

CONTRACTION JOINT. A formed surface, usually vertical, in a dam to create a plane for the regulation of volumetric changes (see also paragraph 7-1).

CONTRACTION JOINT GROUTING. Injection of grout into contraction joints.

CREEP. Deformation over a long period of time under a continuous sustained load.

CRUSHED GRAVEL. Gravel created by the artificial crushing of stone.

CURING. The process of humidity and temperature maintenance performed after concrete placement to assure satisfactory heat of hydration and proper
hardening of the concrete.

CUTOFF. An impervious construction placed beneath a dam to intercept seepage flow.

DAMPING. Resistance that reduces vibration by energy absorption. There are different types of damping such as viscous and Coulomb damping.

DAMPING RATIO. The ratio of the actual damping to the critical damping, critical damping being the minimum amount of damping that prevents free oscillatory vibration.

DEAD LOAD. The constant load on the dam resulting from the mass of the concrete and other attachments.

DEFLECTION. Linear deviation of the structure due to the effect of loads or volumetric changes.

DEFORMATION. Alteration of shape or dimension due to stress.

DENSITY. Weight per unit volume.

DESIGN RESPONSE SPECTRA. Smooth, broad-banded spectra appropriate for specifying the level of seismic design force, or displacement, for earthquake-resistant design purposes.

DIVERSION CHANNEL OR TUNNEL. A structure to temporarily divert water around a damsite during construction.

DURABILITY. The ability of concrete to resist weathering action, chemical attack, abrasion, and other conditions of service.

DYNAMIC MODULUS OF ELASTICITY. The modulus of elasticity computed from the size, weight, shape, and fundamental frequency of vibration of a concrete test specimen, or from pulse velocity (ACI 116R-85).

EFFECTIVE PEAK GROUND ACCELERATION. That acceleration which is most closely related to structural response and to damage potential of an earthquake. It differs from, and is less than, the peak free-field ground acceleration (Newmark and Hall 1982).

ELASTIC DESIGN. Design based on a linear stress-strain relationship and elastic properties of the materials.

ELASTIC LIMIT. The limit of stress without undergoing permanent deformation.

EXPANSION JOINT. A joint between parts of a concrete structure to allow for thermal changes to occur independently.

EXTENSIBILITY. The maximum tensile strain of concrete before cracking.

FOREBAY. The impoundment of water above a dam or hydroelectric plant.

FOUNDATION. The surface and the natural material on which a dam and appurtenant features are constructed.

FOUNDATION DRAINAGE SYSTEM. A line of holes drilled downstream of the grout curtain designed to intercept and control seepage through or beneath a dam so as to reduce uplift pressures under a dam (see also paragraph 7-8).

GALLERY. A long, narrow passage inside a dam used for access, inspection, grouting, or drilling of drain holes.

GROUND MOTION. A general term including all aspects of ground motion, namely particle acceleration, velocity, or displacement, from an earthquake or other energy source.

GROUT. A mixture of water and cement or a chemical solution that is forced by pumping into foundation rocks or joints in a dam to prevent seepage and to increase strength.

GROUT CURTAIN. A row of holes filled with grout under pressure near the heel of the dam to control seepage under the dam (see also paragraph 7-8).

HEAT OF HYDRATION. Heat generated by chemical reactions of cementitious materials with water, such as that evolved during the setting and hardening of portland cement.

HEEL OF DAM. The location where the upstream face of the dam intersects the foundation.

HOMOGENEOUS. Uniform in structure or composition.

INSTANTANEOUS MODULUS OF ELASTICITY. The modulus of elasticity of concrete that occurs immediately after loading (see also Chapter 6).

INSTRUMENTATION. Devices installed on and embedded within a dam to monitor the structural behavior during and after construction of the dam.

INTAKE STRUCTURE. The structure in the forebay that is the entrance to any water transporting facility such as a conduit or tunnel.

ISOTROPIC. Having identical properties in all directions.

LIFT. The concrete placed between two consecutive horizontal construction joints.

MAGNITUDE. A measure of the strength of an earthquake, or the strain energy released by it, as determined by seismographic observations. C. F. Richter first defined local magnitude as the logarithm, to the base 10, of the amplitude, in microns, of the largest trace deflection that would be observed on a standard torsion seismograph at a distance of 100 kilometers from the epicenter (Richter 1958). Magnitudes determined at teleseismic distances are called body-wave magnitude and surface-wave magnitude. The local, body-wave, and surface-wave magnitudes of an earthquake do not necessarily have the same numerical value (see also Chapter 5).

MASS CONCRETE. Any volume of concrete with dimensions large enough to require that measures be taken to cope with generation of heat of hydration of the cement and attendant volume change to minimize cracking (ACI 116R-85).

MAXIMUM CREDIBLE EARTHQUAKE (MCE). The largest earthquake associated with a specific seismotectonic structure or source area within the region examined (see also Chapter 5).

MODIFIED MERCALLI (MM) INTENSITY. A numerical index, developed in 1931, describing the effects of an earthquake on mankind, on structures built by mankind and on the Earth's surface. The grades of the scale are indicated by Roman numerals from I to XII (see also Chapter 5) (Hayes 1980).

MODULUS OF ELASTICITY. The ratio of normal stress to strain.

MONOLITH. A section or block of the dam that is bounded by transverse contraction joints.

NONOVERFLOW SECTION. The section of the dam that is designed not to be overtopped.

OPERATING BASIS EARTHQUAKE (OBE). The earthquake, usually smaller than the MCE, associated with a specific seismotectonic structure or source area within the region examined which reflects the level of earthquake protection desired for operational or economic reasons (see also Chapter 5).

ORTHOTROPIC. Having elastic properties with considerable variations of strength in two or more directions perpendicular to each other.

OUTLET STRUCTURE. A structure at the outlet of a canal, conduit, or tunnel for the purpose of discharging water from the reservoir.

OVERFLOW SECTION. That portion of a dam, usually occupied by a spillway, which allows the overflow of water. Also referred to as spillway section.

PEAK GROUND ACCELERATION (PGA). That acceleration representing the peak acceleration of free-field vibratory ground motion, that is, motion which is not influenced by topography or man-made structures.

PERMEABILITY (LABORATORY) (TO WATER, COEFFICIENT OF). The rate of discharge of water under laminar flow conditions through a unit cross-sectional area of a porous medium under a unit hydraulic gradient and standard temperature conditions, usually 20 degrees Centigrade.

PLACEMENT. The process of depositing, distributing, and consolidating of newly mixed concrete.

POISSON'S RATIO. The ratio of transverse strain to axial stress resulting from uniformly distributed axial stress below the proportional limit of the material.

PORE PRESSURE. The interstitial pressure of water within the mass of rock or concrete. Also called neutral stress and pore-water pressure.

POROSITY. The ratio of the volume of voids to the total volume of the material.

PREDOMINANT PERIOD(S) OF VIBRATION. The period(s) at which maximum spectral amplitudes are shown on response spectra.

PRINCIPAL STRESS. Maximum and minimum stress occurring at right angles to a principal plane of stress.

RESPONSE SPECTRUM. A plot of the maximum response of a series of single-degree-of-freedom damped oscillators (elastic systems) as a function of their natural periods, or frequencies, when the oscillators are subjected to a vibratory ground motion.

RESTRAINT (OF CONCRETE). Internal or external restriction of free movement of concrete in one or more directions.

ROLLER-COMPACTED CONCRETE (RCC). A relatively dry concrete material that has been consolidated through external vibration from vibratory rollers.

SPECTRUM INTENSITY. The integral of the pseudo-velocity response spectrum taken over the range of significant structural vibration periods of the structure being analyzed.

SPILLWAY. The structure over or through which reservoir flood flows are discharged.

SPILLWAY CHUTE. The outlet channel for the spillway discharge.

STILLING BASIN. A basin to dissipate the energy in the water discharged from the spillway or outlet structure.

STRUCTURAL CONCRETE. Concrete used for structural load and forms a part of the structure.

SUSTAINED MODULUS OF ELASTICITY. The modulus of elasticity of concrete that occurs with a constant sustained load over a period of time (see also Chapter 6).

TAILRACE. The channel or canal that carries water away from a dam. Also sometimes called afterbay.

TAILWATER ELEVATION. The elevation of the water surface downstream from a dam or hydroelectric plant.

TEMPERATURE RISE. The increase in temperature in concrete resulting from the hydration of cement.

TEMPERATURE STRESS. Stresses created in concrete from the changes or differentials in temperature.

TENSILE STRENGTH. The maximum stress that a material is capable of resisting under an axial tensile load.

THERMAL CONDUCTIVITY. The measure of the ability of concrete to conduct heat (see also Chapter 6).

THERMAL DIFFUSIVITY. The measure of the facility with which temperature changes take place with a mass of concrete (see also Chapter 6).

TOE OF DAM. The location where the downstream face of the dam intersects the foundation.

TRANSVERSE CRACKS. Cracks that develop at right angles to the longitudinal axis of the dam.

TRANSVERSE JOINT. A joint normal to the longitudinal axis of the dam.

UPLIFT PRESSURE. The upward water pressure in the pores of concrete or rock or along the base of the dam (see also Chapter 3).

WATER STOP. A thin sheet of metal, rubber, plastic, or other material placed across joints in concrete dams to prevent seepage of water through the joint (see also Chapter 7).